



Is there an association between nurse staffing and the deepness of sedation for the patients at an Intensive care Untit (ICU)?

Anne Morgen, RN¹, Florian Grossmann, MScN¹, Sarah Musy, PhD^{1,2,3}, Niklaus Gygli, MScN¹, Prof. Michael Simon, PhD^{1,2,3}

¹University Hospital Basel, Switzerland

²Institute of Nursing Science, University of Basel, Basel, Switzerland ³Nursing and Midwifery Research Unit, Inselspital, Bern University Hospital, University of Bern, Bern, Switzerland

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Introduction and Background

What is it about

"Patients in intensive care should be awake, alert, free of pain, anxiety and delirium. So, they can actively participate in their own treatment and to be able to actively participate in their own treatment and recovery"(1)

Deep sedation of the patients is associated with longer length of stay in hospital and at ICU, higher morbidity and higher mortality $_{\rm (2-6)}$

State of the art is light sedation of the patients (1, 7)

Despite this knowledge deep sedation of the patients is still common in clinical practice $_{(\theta - 10)}$

Lower staffing levels on the ICU are associated with higher mortality and nosocomial infections (11, 12), postoperative complications and adverse events (13)

Gap: no quant. evidence about an possible association yet



To analyse the relationship between different influencing factors of staffing (supply, demand) and patients' sedation levels in intubated and/or restless (delirious) patients the ICU

Assumption and the conceptual model

<u>Assumption</u>: Nurses would like to protect patients for direct adverse events with deeper sedation (dependent of nurse staffing) and do not consider long term outcomes

<u>Hypothesis</u>: better nurse staffing (supply / demand) could lead to lighter sedation for the patients

Conceptual model (based on literature research):

Main variables

Outcome Sedation level with Richmond Aquitation Sedation Scale (RASS) Predictors Demand Patient Complexity of treatment with SGI - categories Others Number of nationals

Registered Nurses (RN)

Number of RNs Qualification (split in 4 categories) Individual drivers of patier Severity of Illness / Estimates hospital mortality in ICU patients with APACHE II, SAPS II, SOFA

Restlessness / Agitation / Delirium with ICDSC Main diagnosis with ICD-10-code Demographics (age, gender, shift sof ventilation, LOS) Indication for deep sedation (4

states derived from guidelines

Concept / variable

Number of patients Admission / discharge

Workload with NEMS Supply

Transfer in / transfer ou



Measurement intervals

Every 8 hours / once per shift B

Every 8 hours / once per shift B

continuous Every 8 hours / once per shift

the patient Every 8 hours / once per shift B

Once per case identifier of

Every 8 hours / once per shift A ies) Every 8 hours / once per shift A

> APACHE II / SAPS II: In the first 24 hours of ICU admission SOFA: once daily

Every 8 hours / once per shif

Once at admission Once at discharge

Once daily

Source



Methods

How and where?

<u>Design</u>: Retrospective cohort study using routinely collected data of : i) patients who were hospitalized at the ICU of the University Hospital Basel between Jan 1st 2015 and Dec 31st 2019

ii) nursing staffing data during the hospitals stay of patients

- Setting
 - multidisciplinary surgical and non-surgical ICU with 40 beds
 - · 3740 patients / year
 - Average length of stay of patients: three days (corresponding to an exposure of 9 nursing shifts)
 - 208.7 nursing FTEs are employed

Data sources and collection:

The routine data will be extracted from three different sources: A) Staffing data: educational grade, the diploma/ degree of the staff, the working time (FTE) and the deployment planning will be extracted from the Personnel resource planning (polypoint PEP) database.

B) Clinical patient data: information like sedation levels, medication, time of ventilation, and patient state will be extracted from the electronic health records PDMS metavision

C) Administrative Patient data: The diagnoses, patients' demographics (age, gender), length of stay at ICU, LOS at hospital and general patient characteristics will be extracted from the medical data ware house

What?

Primary outcome: sedation level of patients

Secondary outcome: influencing factors on nurse staffing (leading from conceptual model) Approach:

Step 1: descriptive analysis

Step 2: creating new outcome staffing variable predicted through different factors (supply / demand / individual drivers) from conceptual model with linear regression (multilevel analysis), analog to method from Musy, et al. (14,15) Step 3: calculation how this new staffing variable is associated with the sedation level through linear regression (multilevel analysis). The staffing variable is aggregated at the unit level (level 2) and the individual drivers of the patient at the individual level (level 1)

Ethical considerations: full ethics application in progress (nearly ready)

What can this study add in clinical practice?

- New knowledge about why Sedation level might be so deep despite other evidence
- Increased awareness for staffing and with that potential improvement of patient outcomes
- Basis for discussions with potential to develop strategies for improvement of quality of care

